

10/566275

1AP20 Rec'd PCT/PTO 30 JAN 2006

DOCKET NO.: 285448 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Christopher John Howard WORT, et al.

SERIAL NO.: NEW U.S. PCT APPLICATION

FILED: HERewith

INTERNATIONAL APPLICATION NO.: PCT/IB04/02391

INTERNATIONAL FILING DATE: July 26, 2004

FOR: METHOD OF MANUFACTURING DIAMOND SUBSTRATES

REQUEST FOR CONSIDERATION OF DOCUMENTS
CITED IN INTERNATIONAL SEARCH REPORT

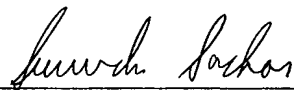
Commissioner for Patents
Alexandria, Virginia 22313

Sir:

In the matter of the above-identified application for patent, notice is hereby given that applicant(s) request that the Examiner consider the documents cited in the International Search Report according to MPEP §609 and so indicate by a statement in the first Office Action that the information has been considered. When the Form PCT/DO/EO/903 indicates both the search report and copies of the documents are present in the national stage file, there is no requirement for the applicant(s) to submit them (1156 O.G. 91 November 23, 1993).

Respectfully submitted,

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PA135648/PCT		FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/B2004/002391		International filing date (day/month/year) 26.07.2004		Priority date (day/month/year) 30.07.2003
International Patent Classification (IPC) or national classification and IPC C30B33/00, C30B33/06, H01L21/56, H01L21/20				
Applicant ELEMENT SIX LIMITED et al.				
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 1 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input checked="" type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>				
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application</p>				
Date of submission of the demand 11.02.2005		Date of completion of this report 03.11.2005		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465		Authorized Officer Edmeades, M Telephone No. +49 89 2399-2731		



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IB2004/002391

10/566275

AP20 RECEIVED 30 JAN 2006

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
 - ☐ This report is based on translations from the original language into the following language, which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

Description, Pages

1-21 as originally filed

Claims, Numbers

7-51 as originally filed

1-6 received on 13.07.2005 with letter of 29.06.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:
 - ☐ the description, pages
 - ☐ the claims, Nos.
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):
4. ☒ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
 - ☐ the description, pages
 - ☒ the claims, Nos. 1
 - ☐ the drawings, sheets/figs
 - ☐ the sequence listing (*specify*):
 - ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IB2004/002391

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	19,43
	No: Claims	1-18,20-42,44-51
Inventive step (IS)	Yes: Claims	
	No: Claims	1-51
Industrial applicability (IA)	Yes: Claims	1-51
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/IB2004/002391

SECTION I

1. Claim 1 now specifies that there exists "**sufficient spacing**" between the plates "**such that**" an error ... affects only one plate.

This feature implies a causal link between the amount of space between the plates and errors affecting neighbouring plates. Such a link was not part of the original disclosure, however. The passage at page 9, l.32-34 of the specification on which this feature is based states merely that using a set of non-contacting plates has this desired effect - without giving any information regarding the magnitude of the spacing.

SECTION V

1. Reference is made to the following documents:

D1: EP-A-589464
D2: US-A-5420443
D3: US-A-5907768
D4: WO-A-03005443
D5: JP-A-8208387

2. D1 discloses (see whole document, for example Fig.12) a device and method comprising all of the features of claim 1 (single crystal diamond plates 60; support layer 61 or 63) as well as the additional features of claims 2,4-18,20-27,31-34,38-41,44-48.

It is noted that the adjacent plates in D1 are non-contacting - see page 7, l.29-31 and page 11, l.35-37 and Fig.5.

3. D2 discloses (see Figs.1,2 and corresponding text) a device and method comprising all of the features of claim 1 (single crystal diamond plates 22; support layer 21,23) as well as the additional features of claims 2,4-15,17,20-27,31-34,38-41,44-48.

The object of D2 is to avoid using a diamond substrate. The plates 22 may be single crystal diamond (see Col.5, lines 56-68 and Fig.5).

4. D3 discloses (see Fig.4) a device and method comprising all of the features of claim 1 (single crystal diamond plates 110; support layer 102) as well as the additional features of claims 2,4-6,9,17,18,20,31,32,33,34,38-41,44-46.

It is considered implicit in view of the opening passage at Col.1, l.10 - Col.2, l.16 (problem to be solved) that the diamond plates in D3 are preferably single crystal, even if this information is not explicitly disclosed in this document.

5. D4 (see Fig.10 and corresponding text) discloses a device and method comprising all of the features of claim 1 (single crystal diamond plates A1-An); support layer B) as well as the additional features of claims 2,4-8,16,17,20-27,31-34,38,41,44,45,47,48.

In view of the passage at page 1, the skilled person would consider it implicit that the structure described in Fig.10 may also comprise single-crystal diamond.

6. D5 discloses a device comprising all of the features of claims 49-51. Moreover it is considered to lie within the usual competence of the skilled person to extend the teaching of D5 (with or without a combination with the other cited documents) to include a plurality of single-crystal plates, so that the subject-matter of claims 19,43 lacks an inventive step.

SECTION VIII

1. The presence of a plurality of independent claims in the same category means that the claims as a whole are not concise. In the present case a single independent claim in any category is appropriate.
2. The claims are unclear:

- The feature discussed in section I would, if considered admissible, also introduce a lack of clarity. This is because whether an error in a given plate affects other tiles would be dependent on the kind of processing to be carried out on the assembly. However, this information is not, and cannot, be included within the device claim.
- Method claim 33 contains the unclear feature "processing **as required** ... respective single crystal diamond substrates". From this feature it remains unclear which, or even if any, processing steps are carried out.
In Section V, it has been interpreted in the broadest sense to mean that some additional processing steps are carried out. Moreover, the examiner notes that the claim does not require that the diamond substrates are separated as part of the further processing.
- The expression "defined tolerance of ... conceptual plane" in claim 9 is unclear as neither the tolerance nor the plane are defined in a clear manner.
- In claims 20,24 the term "the wafer" is used, though this is the first reference to a wafer. Moreover the arrangement of the plates is unclear.

10/566275

-22-AP20 Re 01 JAN 2006

CLAIMS:

1. A diamond wafer assembly for use in a method of processing single crystal diamond substrates, comprising a plurality of single crystal diamond plates fixed to a support layer in a substantially planar arrangement such that at least one of the major surfaces of the respective fixed single crystal diamond plates defines a fabrication surface that is exposed for further processing, there existing sufficient spacing between each diamond plate such that an error with one plate position, shape or orientation affects only that plate.
2. A diamond wafer assembly according to claim 1, wherein only one of the major surfaces of the respective fixed single crystal diamond plates is exposed for further processing, the support layer forming a backing layer for the fixed single crystal diamond plates opposite the respective fabrication surfaces.
3. A diamond wafer assembly according to claim 1, wherein both of the major surfaces of the respective fixed single crystal diamond plates are exposed for further processing, the support layer extending between the respective single crystal diamond plates.
4. A diamond wafer assembly according to any one of the preceding claims, wherein the single crystal diamond plates are CVD diamond plates.
5. A diamond wafer assembly according to any one of the preceding claims, wherein the single crystal diamond plates are arranged in a predetermined array.
6. A diamond wafer assembly according to claim 1, wherein the predetermined array is regular and based on a two dimensional array of lattice points with one or more plates associated with each lattice point.

INTERNATIONAL SEARCH REPORT

PCT/IB2004/002391

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C30B33/00 C30B33/06 H01L21/56 H01L21/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C30B H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 672 240 A (HARTSELL MICHELLE L ET AL) 30 September 1997 (1997-09-30) column 4, line 34 - column 7, line 65; figures 1-6	1,28-30, 35-37
X	EP 0 589 464 A (SUMITOMO ELECTRIC INDUSTRIES) 30 March 1994 (1994-03-30) page 6, line 41 - page 12, line 58 -/-	1,2, 4-18, 20-27, 31-34, 38-41, 44-48

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- *G* document member of the same patent family

Date of the actual completion of the international search

17 December 2004

Date of mailing of the international search report

30/12/2004

Name and mailing address of the ISA

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Authorized officer

Edmeades, M

INTERNATIONAL SEARCH REPORT

PCT/IB2004/002391

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 198 070 A (JONES BARBARA L) 30 March 1993 (1993-03-30) column 2, line 4 - column 4, line 62; figure 1	1,3-5,7, 8,16-18, 20-27, 30,32, 33,42,47
X	WO 03/005443 A (COMMISSARIAT ENERGIE ATOMIQUE ; ASPAR BERNARD (FR); FOURNEL FRANCK (FR) 16 January 2003 (2003-01-16) page 14, line 20 - page 22, line 4; figure 10	1,2,4-8, 16,17, 20-27, 38,41, 44,45, 47,48
X	US 5 907 768 A (DREIFUS DAVID L ET AL) 25 May 1999 (1999-05-25) column 5, line 40 - column 8, line 60; figures 1-4	1,2,4-6, 9,17,18, 20, 31-34, 38-41, 44-46
X	US 5 420 443 A (DREIFUS DAVID L ET AL) 30 May 1995 (1995-05-30) column 9, line 41 - column 18, line 25; examples 1,2	1,2, 4-15,17, 20-27, 31-34, 38-41, 44-48
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 12, 26 December 1996 (1996-12-26) -& JP 08 208387 A (SUMITOMO ELECTRIC IND LTD), 13 August 1996 (1996-08-13) abstract	3,18,19, 31-33, 42,43
A	US 6 562 127 B1 (HOBART KARL ET AL) 13 May 2003 (2003-05-13) column 5, line 22 - column 6, line 21 column 11, lines 19-38	19, 28-30, 35-37

INTERNATIONAL SEARCH REPORT

PCT/IB2004/002391

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